Outrageous Ooze

Thank you for downloading the science and mathematics activity packet! Below you will find a list of contents with a brief description of each of the items. This activity packet contains all the information (including any handouts) you will need to run this activity in your own classroom or at a science festival.

Please note: some activities might require the need for a facilitator to be present to oversee the activity. Activities that require a facilitator will be clearly noted.

-Community Resources for Science

These materials may be used for educational purposes

ACTIVITY PACKET CONTENTS

1. Organizer instructions for the person running the activity
    - Print suggestion: 1 for the facilitator
    - Includes information for setup prior to the event (e.g., materials prep)
    - Estimated cost for one set of supplies, excluding common household items
    - Estimated number of participants per one set of supplies
2. Supplemental background information for organizer/facilitator
    - This provides additional information for the organizer or activity facilitator regarding the science behind the activity
    - Questions to ask participants about their observations
3. Background Information aka What's Going On? (tabletop sign/printout)
    - Print suggestion: 1 to put in a plastic sign holder
    - Explains the science and background information behind the activity
4. Participant Instructions (tabletop sign/printout)
    - Print suggestion: 1-2 to put in a plastic sign holder
5. Activity Printout(s) for participants*
    - Print suggestion: number of expected participants at event
    - *Not every activity has printouts
6. Take home sheet for participants
    - Print suggestion: number of expected participants (most packets are formatted as 2 half-sheet handouts)
    - Easy-to-follow instructions for participants to try the activity at their homes

Outrageous Ooze

ORGANIZER INSTRUCTIONS

Grade(s): K-5

Standard connections: Science and Engineering Practices

Next Generation Science Standards: Science and Engineering Practices

- **Planning and Carrying Out Investigations:** Make predictions based on prior experience.
- **Obtaining, evaluating and communicating Information:** Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s).

Objective: Create ooze and explore its unique properties

Activity Overview and background: students will experiment with their ooze to observe how its properties differ from Newtonian liquids

This activity requires the use of a facilitator to assist participants

Estimated cost for one set activity supplies: $10.75

Estimated number of participants per set of supplies: 7 (for each 35 oz. container of dry cornstarch)

Materials:

- Newspaper
- Measuring Cups
- 1 cup dry cornstarch ($5/35 oz.)
- Large bowls
- Food coloring, optional ($2.75/ 4 bottles/pkg)
- Water
- Plastic sandwich bags ($3/100 ct)

Set Up:

1. Cover table in newspapers
2. Set out all materials along with What's Going On and Instructions information

Suggested Setup:

- Pre-measure cornstarch ahead of time, with bowl of extra cornstarch if needed

https://www.exploratorium.edu/science_explorer/ooze.html

These materials may be used for educational purposes

BACKGROUND INFORMATION

Your Ooze is made up of tiny, solid particles of cornstarch suspended in water. Chemists call this type of mixture a *colloid.*

As you found out when you experimented with your Ooze, this colloid behaves strangely. When you bang on it with a spoon or quickly squeeze a handful of Ooze, it freezes in place, acting like a solid. The harder you push, the thicker the Ooze becomes. But when you open your hand and let your Ooze ooze, it drips like a liquid. Try to stir the Ooze quickly with a finger, and it will resist your movement. Stir slowly, and it will flow around your finger easily.

Most liquids don't act like that. If you stir a cup of water with your finger, the water moves out of the way easily—and it doesn't matter whether you stir quickly or slowly. Your finger is applying what a physicist would call a *sideways shearing force* to the water. In response, the water *shears*, or moves out of the way. The behavior of your Ooze relates to its *viscosity,* or resistant to flow. Water's viscosity doesn't change when you apply a shearing force—but the viscosity of your Ooze does.

Back in the 1700s, Isaac Newton identified the properties of an ideal liquid. Water and other liquids have the properties that Newton identified are called *Newtonian fluids*. Your Ooze doesn't act like Newton's ideal fluid. It's a *non-Newtonian Fluid.*

There are many non-Newtonian fluids around. They don't all behave like your Ooze, but each one is weird in its own way. Ketchup, for example, is a non-Newtonian fluid. (The scientific term for this type of non-Newtonian fluid is *thixotropic.* That comes from the Greek works *thixis*, which means "the act of handling," and *trope*, meaning "change.)

Quicksand is a non-Newtonian fluid that acts more like your Ooze—it gets more viscous when you apply a shearing force. If you ever find yourself sinking in a pool of quicksand (or a vat of cornstarch and water), try swimming toward the shore very slowly. The slower you move, the less the quicksand or cornstarch will resist your movement.

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What's Going On?

Why does my Ooze act like that?

Your Ooze is made up of tiny, solid particles of cornstarch suspended in water. Chemists call this type of mixture a colloid.

This colloid behaves strangely. When you bang on it or quickly squeeze a handful of Ooze, it freezes in place, acting like a solid. The harder you push, the thicker the Ooze becomes. Try to stir the Ooze quickly with a finger, and it will resist your movement. Stir slowly, and it will flow around your finger easily.

Most liquids don't act like that! Your finger is applying what a physicist would call a sideways shearing force to the water. In response, the water *shears*, or moves out of the way. The behavior of your Ooze relates to its viscosity, or resistant to flow. Water's viscosity doesn't change when you apply a shearing force—but the viscosity of your Ooze does.

Wow! I Didn't Know That!

Ketchup, like Ooze, is a non-Newtonian fluid. Physicists say that the best ay to get ketchup to flow is to turn the bottle over and be patient. Smacking the bottom of the bottle actually slops the ketchup down!

Instructions

1. Put the cornstarch into a bowl and add a 1-2 drops of food coloring
2. Add water slowly, mixing cornstarch and water with your fingers until all the powder is wet
3. Keep adding water until the ooze feels like a liquid when you're mixing it slowly
    - Then try tapping on the surface with your finger or a spoon. When Ooze is just right, it will feel solid
    - If your Ooze is too powdery, add a little more water
    - If it's too wet, add more cornstarch
4. Play around with your Ooze!
    - Pick up a handful and squeeze it. *What happens when you stop?*
    - Rest your fingers on the surface of the Ooze. Let them sink down to the bottom of the bowl, then try to pull them out fast. *What happens?*
    - Take a blob and roll it between your hands to make a ball. Then stop rolling. The Ooze will trickle away between your fingers.
    - Put a small plastic toy on the surface. Does it stay there or does it sink?

Outrageous Ooze

TRY IT AT HOME!

What you'll need:

- Newspaper
- Measuring Cups
- Dry cornstarch
- Large bowls
- Food coloring (optional)
- Water
- Plastic sandwich bags

Instructions:

1. Put newspaper down on your counter or table
2. Put the cornstarch into the bowl. Add a drop or two of food coloring (use whatever colors you like). Add water slowly, mixing cornstarch and water with your fingers until all the powder is wet.
3. Keep adding water until the ooze feels like a liquid when you're mixing it slowly. Then try tapping on the surface with your finger or a spoon. When Ooze is just right, it won't splash—it will feel solid. If your Ooze is too powdery, add a little more water. If it's too wet, add more cornstarch.
4. Play around with your Ooze!

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4. Play around with your Ooze!